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PROCESS ANALYZERS

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Rev. 8/02

ChemScan[®] Application Summary #156 Lagoon Discharge Monitoring

Statement of the Problem

Many small communities, generally those with populations under 20,000 persons use lagoons and other natural land systems for wastewater treatment. There are currently more than 6,000 of these systems in operation throughout the U.S.

Un aerated stabilized lagoons can be classified as aerobic, anaerobic or facultative depending on depth, surface area, stage of treatment and other factors. These lagoons can be constructed as a series of ponds or zones for roughing, biological treatment and tertiary treatment. If un aerated ("naturally" aerated), any aerobic process in the lagoon will rely on natural oxygen transfer at the lagoon surface which will, in turn, depend on surface area, water depth, natural turbulence and water temperature. An anaerobic layer may exist at the bottom of these un aerated lagoons. Aerated lagoons, however, use mechanical aerators or diffused air and therefore tend to be deeper than stabilized un aerated lagoons and less dependent on natural conditions.

Lagoons are typically operated to reduce BOD and suspended solids, but may also nitrify during warm weather if given adequate capacity and available oxygen. Some locations have discharge permits, which limit the amounts of ammonia that can be discharged from the lagoon. This may require increased recycle of effluent or even seasonal storage of the effluent until improved nitrification can be achieved.

Control Strategy

Process optimization for a lagoon generally relies on control of water level, control of flow from zone to zone including possible recycle flow and control of aeration rate if the lagoon is aerated.

Although dissolved oxygen and pH monitoring are typical parameters for lagoon control, they may not be reliable indicators of nitrification activity and do not provide a means to assure that ammonia discharge requirements are being achieved. Nitrification lagoons may require additional measurements.

A multiple sample line ChemScan analyzer can be used to obtain automatic analysis of ammonia concentrations from one or more zones and in the final effluent of the lagoon. These on-line ammonia measurements can be used to automatically adjust flow, recycle and aeration rates and to establish a running record of effluent ammonia concentration.

The running record is used to calculate an average or total ammonia discharge concentrations over a period of time, with minimal operator attention and without the need to collect and process composite samples.